What is claimed is:

1. A power regeneration circuit for a power conversion system comprising a converter transformer having an intermediate tap of the primary coil, a first switching element connected between an end of the primary coil of the converter transformer and the ground, a second switching element connected between the other end of the primary coil and the ground, and a smoothing capacitor connected in parallel to a DC voltage source between the intermediate tap of the primary coil of the converter transformer and the ground, the power regeneration circuit being used for power regeneration of the power conversion system for turning on/off the switching elements alternately with an in-between period of turning off the switching elements, the power regeneration circuit further comprising at least

a charge/discharge element connected in parallel to the coil portion between one end of the primary coil and the intermediate tap, and

a charge/discharge path forming a first closed circuit of the coil portion and the charge/discharge element in response to the transition of one of the switching elements connected to one end of the primary coil to off state, the charge/discharge path forming a second closed circuit of the coil portion, the charge/discharge element and the smoothing capacitor in response to the

transition of the other switching element to off state.

2. A power regeneration circuit according to claim 1, wherein

the first closed circuit includes at least one conductive element connected between the charge/discharge element and the intermediate tap of the primary coil and adapted to conduct in response to the voltage increase at one end of the primary coil, and

the second closed circuit includes at least another conductive element connected between the joint between the charge/discharge element and the conductive element and the ground side of the smoothing capacitor and adapted to conduct in response to a voltage drop of the joint.

3. A power regeneration circuit for a power conversion system comprising a converter transformer having an intermediate tap of the primary coil, a first switching element connected between an end of the primary coil of the converter transformer and the ground, a second switching element connected between the other end of the primary coil and the ground, and a smoothing capacitor connected in parallel to a DC voltage source between the intermediate tap of the primary coil of the converter transformer and the ground, the power regeneration circuit being used for

power regeneration of the power conversion system for turning on/off the switching elements alternately with an in-between period of turning off the switching elements, the power regeneration circuit further comprising at least

a first charge/discharge element connected in parallel to a first coil portion between one end of the primary coil and the intermediate tap,

a second charge/discharge element connected in parallel to a second coil portion between the other end of the primary coil and the intermediate tap,

a first charge/discharge path forming a first closed circuit of the first coil portion and the first charge/discharge element in response to the transition of the first switching element to off state, the charge/discharge path forming a second closed circuit of the first coil portion, the first charge/discharge element and the smoothing capacitor in response to the transition of the second switching element to off state, and

a second charge/discharge path forming a third closed circuit of the second coil portion and the second charge/discharge element in response to the transition of the second switching element to off state, the second charge/discharge path forming a fourth closed circuit between the second coil portion, the second charge/discharge element and the smoothing capacitor in

response to the transition of the first switching element to off state.

4. A power regeneration circuit according to claim 3, wherein

the first closed circuit includes a first conductive element connected between the first charge/discharge element and the intermediate tap of the primary coil and adapted to conduct in response to the voltage increase at one end of the primary coil,

the second closed circuit includes a second conductive element connected between a first joint between the first charge/discharge element and the first conductive element and the ground side of the smoothing capacitor and adapted to conduct in response to the voltage drop across the first joint,

the third closed circuit includes a third conductive element connected between the second charge/discharge element and the intermediate tap of the primary coil and adapted to conduct in response to the voltage increase at the other end of the primary coil, and

the fourth closed circuit includes a fourth conductive element connected between a second joint between the second charge/discharge element and the third conductive element and the ground side of the smoothing

capacitor and adapted to conduct in response to the voltage drop across the second joint.

5. A power conversion system comprising a converter transformer having an intermediate tap of the primary coil, a first switching element connected to an end of the primary coil of the converter transformer, a second switching element connected to the other end of the primary coil, and a smoothing capacitor connected in parallel to a DC voltage source connected to the intermediate tap of the primary coil of the converter transformer, the power conversion system turning on/off the switching elements alternately with an in-between period of turning off both the switching elements, the power conversion system further comprising

a first charge/discharge element connected in parallel to a first coil portion between one end of the primary coil and the intermediate tap,

a second charge/discharge element connected in parallel to a second coil portion between the other end of the primary coil and the intermediate tap,

a first charge/discharge path forming a first closed circuit of the first coil portion and the first charge/discharge element in response to the transition of the first switching element to off state, the first

charge/discharg path forming a second closed circuit of the first coil portion, the first charge/discharge element and the smoothing capacitor in response to the transition of the second switching element to off state, and

a second charge/discharge path forming a third closed circuit of the second coil portion and the second charge/discharge element in response to the transition of the second switching element to off state, the second charge/discharge path forming a fourth closed circuit of the second coil portion, the second charge/discharge element and the smoothing capacitor in response to the transition of the first switching element to off state.

6. A power conversion system according to claim 5, wherein

the first closed circuit includes a first conductive element connected between the first charge/discharge element and the intermediate tap of the primary coil and adapted to conduct in response to the voltage increase at one end of the primary coil,

the second closed circuit includes a second conductive element connected between a first joint between the first charge/discharge element and the first conductive element and the ground side of the smoothing capacitor and adapted to conduct in response to the voltage drop of the

first joint,

the third closed circuit includes a third conductive element connected between the second charge/discharge element and the intermediate tap of the primary coil and adapted to conduct in response to the voltage increase at the other end of the primary coil, and

the fourth closed circuit includes a fourth conductive element connected between a second joint between the second charge/discharge element and the third conductive element and the ground side of the smoothing capacitor and adapted to conduct in response to the voltage drop of the second joint.